

INDIANA DEPARTMENT OF TRANSPORTATION
MATERIALS & TESTS DIVISION

DETERMINING ASPHALT CONTENT OF PREFORMED EXPANSION
JOINT FILLERS FOR CONCRETE PAVING AND STRUCTURAL CONSTRUCTION
ITM No. 801-92T

1. SCOPE

1.1 This method of test covers the procedure for determining readily extractable materials in preformed joint sealants as percentage asphalt on a direct mass basis.

1.2 This standard does involve the use of hazardous materials, operations, and equipment.

1.3 It is the responsibility of the user of this standard to determine, apply, and comply with appropriate safety and health practices and regulatory limitations.

2. SUMMARY OF METHOD

2.1 A sample of material taken from a single plank or sheet is extracted using an appropriate solvent. The asphalt content is calculated as the percent difference from the mass of the oven-dried sample and the mass of the oven-dried extracted residue.

3. APPARATUS

3.1 Oven, operating at 104 ± 4 °C

3.2 Balance, conforming to the requirements of AASHTO M 231, class G2

3.3 Desiccator. A glass or plastic desiccator, large enough to hold one or more samples, including any containers used for drying or weighing the sample

3.4 Hot Plate. A hot plate large enough to safely support an extraction jar, and of sufficient heat capacity to bring 25 to 75 mm of solvent in the extraction jar to a boil in 15 minutes or less

3.5 Reflux Asphalt Extractor. Nominal size 2000 grams

3.5.1 Sample Holders. Screen wire cones or screen wire baskets, made of non-rusting metal and supported by a tripod stand of non-rusting metal. Nominal dimensions of stand are: 190 mm O.D. and 220 mm height. Fabric of screen may be from 850 μ m to 1.70 mm wire mesh.

3.5.2 Extraction Jar. A heavy wall, flat bottomed heat resistant glass cylinder, with the top ground to form a seal with the condenser. Nominal dimensions of the cylinder are: 220 mm I.D. and 410 mm inside height with a wall thickness of 8 mm or more.

3.5.3 Condenser. A large metal condenser of copper, brass, or other oxidation resistant metal. The condenser shall be cone-shaped and of a diameter to fit the extraction cylinder.

3.6 Sample Containers. Any heat resistant apparatus large enough to hold sample for determining mass, and providing adequate ventilation for thorough drying. Wire mesh baskets of about 2000 mL capacity or friction top quart paint cans with ventilation holes in the bottom and sides are satisfactory.

3.7 Wire Tool. A hooked wire of about 300 mm length, sturdy enough to lift basket and sample into and out of the extraction cylinder.

3.8 Extraction Solvent. Technical grade 1,1,1-Trichloroethane or Technical Grade Trichloroethylene. Other solvents may be used, provided that the solvent is listed as a suitable asphalt extraction solvent in either AASHTO T 42 or AASHTO T 164.

4. SAFETY PRECAUTIONS

4.1 The solvents 1,1,1-Trichloroethane and Trichloroethylene are known to have toxicity. Other solvents or the samples themselves may also present toxicity or flammability hazards.

4.2 The extraction step and the initial drying of the extracted sample will be performed in a well ventilated area, such as a fume hood.

4.3 Prevent any extraction solvent from contacting any hot surface, such as a hot plate.

4.4 Safety gloves and clothing may be needed. Use wire tools to raise and lower sample basket in jar even though rubber gloves are also used.

5. PREPARATION OF TEST SPECIMEN

5.1 Specimen or specimens shall be cut from a single plank or sheet avoiding any contaminated or physically damaged areas. Only representative material will be tested.

5.2 Sample will be broken into fragments nominally 25 mm or less on a side. These fragments will be dried for a minimum of 2 hours in a mechanical convection oven operating at 104 ± 4 °C with ventilation ports slightly open to allow escape of volatiles. A vacuum oven operation at 104 ± 4 °C will also be allowed. The sample container will be heated in the same manner as the sample. The sample and container both are cooled to the room temperature in the desiccator.

5.3 Determine the mass of the empty sample container, and of the sample container and sample to the nearest 0.1 g. The mass of the sample shall be between 100 g and 200 g.

6. EXTRACTION AND PRELIMINARY DRYING OF RESIDUE

6.1 The extraction shall be performed in a fume hood or other well ventilated area.

6.2 Place all of sample in one of the extraction baskets. Using the wire tool, lower the basket into the extraction jar. Saturate the sample with solvent and add additional solvent to a depth of 25 to 75 mm in the extraction jar. Run a moderate stream of cooling water through the condenser. Place the condenser on the extraction jar; the extraction jar on the hot plate and extract the asphalt by refluxing hot solvent through the sample. Reflux until the solvent appears clean and clear. Continue refluxing for at least another 10 minutes.

6.2.1 Preliminary soaking or partial extraction of the sample in other devices is permitted provided that after full extraction:

- (a) The sample is not contaminated;
- (b) All insoluble material is retained; and
- (c) All asphalt is extracted.

6.3 Preliminary drying shall be performed in a well ventilated area. Remove sample and extraction jar from the hot plate. Let cool until little or no solvent drips from the bottom of the basket. Remove the basket and sample from the extraction jar using the wire tool and safety gloves. Allow the sample to air dry in the ventilated area. Return the extracted sample to the original sample container and dry it further on a hot plate set at a low temperature (still in the ventilated area).

7. FINAL DRYING

7.1 Return extracted sample and sample container to 104 ± 4 °C oven for at least 2 hours. Cool sample and sample container to room temperature in the desiccator, and weigh to nearest 0.1 g. Dry to constant mass by repeating oven drying and desiccation. Constant mass is defined as consecutive recordings of masses that differ by no more than 0.1 g.

8. CALCULATIONS

8.1 Asphalt, or bitumin content as percent by mass.

$$\text{Asphalt \%} = \frac{W1 - W2}{W1} \times 100\%$$

where:

W1 = Oven dry mass of sample before extraction.

W2 = Oven dry mass of residue after extraction.